Asset Management System Implementation & Integration

Long Island Rail Road

July 17, 2012

About the LIRR

- Chartered April 24, 1834
- Agency of the Metropolitan Transportation Authority (MTA)
- Commuter Railroad Serving Nassau and Suffolk Counties (Long Island) and Queens, Brooklyn and Manhattan (New York City)
- 11 Branches
- 3 Western Terminals –
  - Penn Station (Manhattan)
  - Atlantic Terminal (Brooklyn)
  - Hunterspoint Av (Queens)
- Jamaica Station - LIRR's hub, served by 10 Branches


Metropolitan Transportation Authority
MTA Long Island Rail Road
Key
Full Time rail station
Accessible station
Part Time rail station
Major Transit Hub
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Long Island Sound
Bridgeport & Port Jefferson Steamship Co.
Cross Sound Ferry
(Orient Point, LI-
New London, Conn)
Greenport
North Ferry Co.
(Greenport-Shelter Island)
Southold
South Ferry Co.
(North Haven-
Shelter Island)
Montauk
Mattituck
Amagansett
East Hampton
Peconic
Bay
Riverhead
Bridgehampton
Southampton
Hampton
Bays
Westhampton
Speonk
MONTAUK BRANCH
Port Jefferson
Stony Brook
PORT JEFFERSON BRANCH
Kings Park
St. James
Smithtown
SUFFOLK
Northport
Greenlawn
Huntington
Cold Spring Harbor
Syosset
RONKONKOMA BRANCH
Ronkonkoma
Medford
Yaphank
Mastic-Shirley
Central Islip
Brentwood
Deer Park
Wyandanch
Pinelawn
Farmingdale
Great
River
Oakdale
Sayville
Bellport
Patchogue
Davis Park
Ferry Co.
Sayville Ferry
Service, Inc.
Fire Island
Ferries, Inc.
Islip
Bay Shore
Babylon
Great South Bay
BABYLON BRANCH
Lindenhurst
Copiague
Amityville
Massapequa
Massapequa Park
Seaford
Wantagh
Bellmore
Merrick
Freeport
Baldwin
Rockville
Centre
Lynbrook
Centre
Av
E. Rockaway
Oceanside
Island Park
Long Beach
LONG BEACH BRANCH
Locust Valley
Oyster Bay
Glen Cove
Glen Street
OYSTER BAY BRANCH
Sea Cliff
Glen Head
Greenvale
NASSAU
Roslyn
Albertson
East
Williston
Westbury
Carle Place
Hicksville
Bethpage
HEMPSTEAD BRANCH
Hempstead
West Hempstead
WEST HEMPSTEAD BRANCH
Hempstead Gardens
Lakeview
Malverne
Westwood
Port
Washington
Plandome
PORT WASHINGTON BRANCH
Manhasset
Great Neck
Little Neck
Douglaston
Bayside
Auburndale
Broadway
Murray Hill
Flushing-Main St
Mets-Willets Point
THE
BRONX
MANHATTAN
QUEENS
Woodside
Penn
Station
Hunterspoint Av
Long
Island City
Forest Hills
Kew Gardens
Queens
Village
Hollis
Jamaica
St. Albans
Belmont Pk
Stewart Manor
Nassau Blvd
Garden City
Country Life Press
Rosedale
Valley Stream
New Hyde Pk
Floral Park
Bellerose
Morrison Av
Mineola
CITY TERMINAL ZONE
Atlantic Terminal
Brooklyn
Nostrand Av
East New York
Jamaica
JFK
Locust Manor
Laurelton
Gibson
Hewlett
Woodmere
Cedarhurst
Lawrence
Inwood
Far Rockaway
FAR ROCKAWAY BRANCH
BROOKLYN
Jamaica
Bay
Atlantic Ocean
N

About the LIRR

FLEET

1,006 Electric MU Cars
134 Bi-Level Coaches (Diesel-hauled)
23 Diesel Locomotives
22 Dual Mode Locomotives

INFRASTRUCTURE

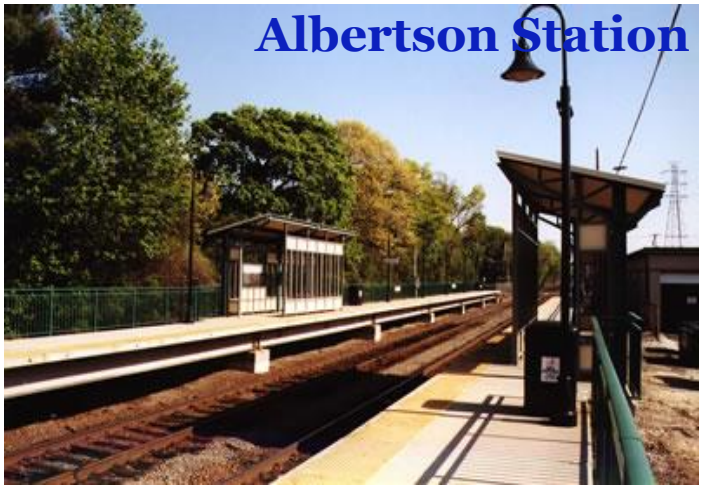
Over 661 miles of track
124 Passenger Stations
294 Grade Crossings
750 Overgrade/Undergrade Bridges
29 Viaducts
73 Interlockings
328 miles of 3rd Rail
108 Substations

Asset Management – Drivers

- Since 1982, the MTA agencies have had a series of 5 Year Capital Programs, totaling $75 billion in capital investments (1982-2009)
- Capital Planning Process
  - Asset Inventory
  - Twenty Year Needs Assessment
  - Development of 5 Year Capital Program
- Recent Financial Challenges – Re-examine future assumptions of both funding and project scoping

Transformative Projects

- In past LIRR Capital Programs, much of the investments were large scale:
  - Large Scale Fleet Replacement
  - Construction of High Level Platforms at all Diesel Stations
  - Major Investment in Jamaica Station and Atlantic Terminal



Jamaica Station – Before

Station built 1913

Jamaica Station – After

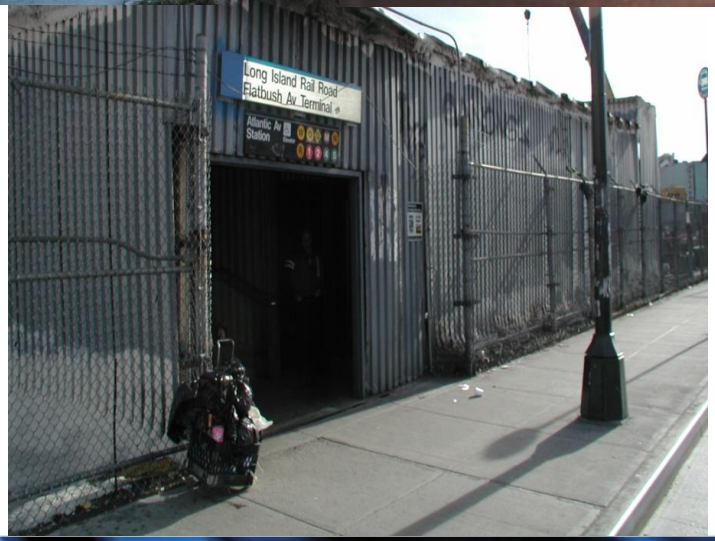
Station Renovation 2002 - 2005

Atlantic Terminal – Before

Station building built 1907 & Demolished 1988

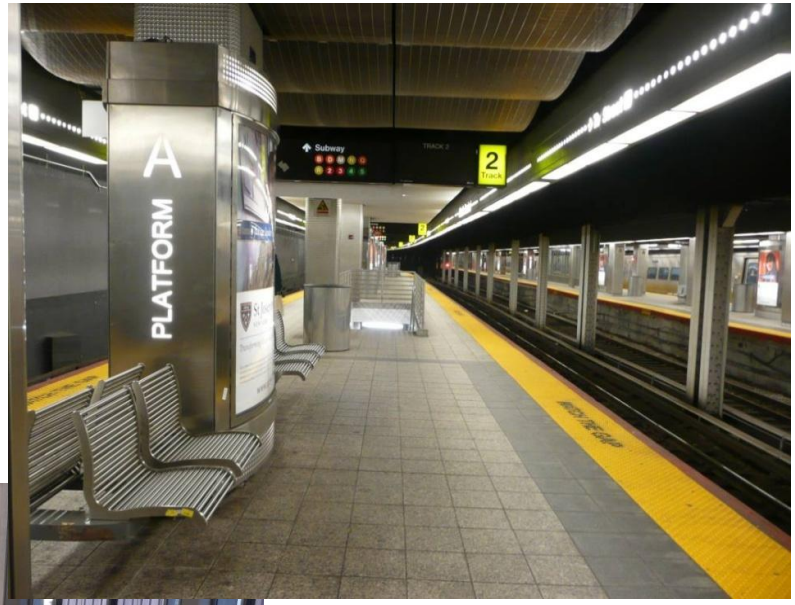
Station Building - 1986

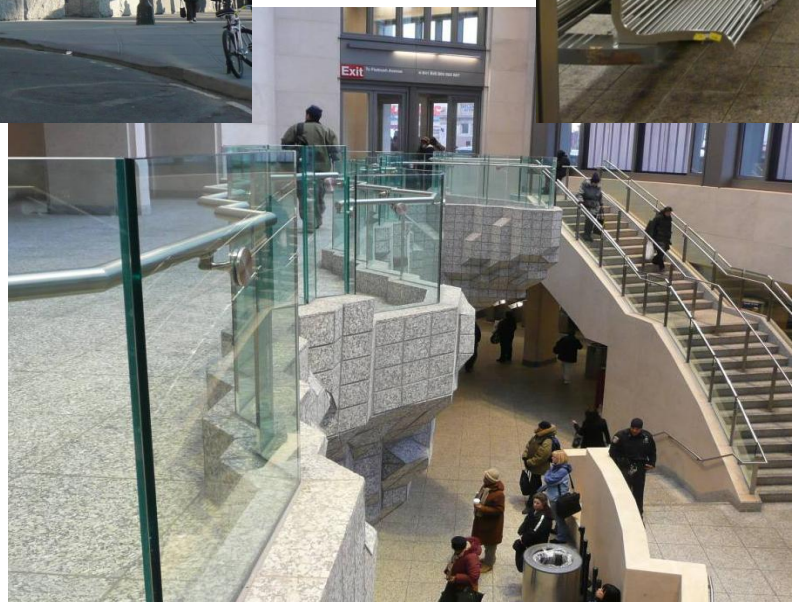
Platform - 2001



Atlantic Terminal – After

Station Renovation 2004 - 2010





Increased Focus on Lifecycle Costs

Moving forward, the LIRR's focus will be more on minimizing lifecycle costs of assets:

–Examination of Inspection and Maintenance Practices

–Identify Candidates for Component Replacement, focusing on Signals and Substations

–Assess & Prioritize Assets in a more detailed way (i.e. risk, criticality and interdependency)

–Recognition of our unmet data needs, particularly in regards to Maintenance / Repair Costs / Decision Support

Enterprise Asset Management (EAM)

- Implement an EAM program to achieve systematic, optimal and sustainable asset management at the lowest lifecycle cost:
  - Deliver necessary outputs to the asset managers and decision-makers
  - Deliver outputs valued by customers, funders and other key stakeholders
- EAM Benefits:
  - Understand Risks associated with Capital Assets & how these Risks change over time
  - Corporate impact / consequences of increasing or decreasing capital investment levels of a particular asset
  - Provide asset data and information to decision makers on multiple levels that facilitates knowledge-based decisions
  - Consistent asset management framework company-wide

Path Towards EAM

- **Rolling Stock**
  - Rolling Stock Maintenance – Replaced legacy software system with Maximo
  - Fixed locations – Hillside, West Side Yard, Morris Park / Richmond Hill
  - Major Fleet Replacement Effort
  - Implementation of Reliability Centered Maintenance (RCM) Program
    - Need for Data
  - Three Types of Rolling Stock:
    - M-3 Electric Multiple Units (1984 – 1986)
    - M-7 Electric Multiple Units (2002 – 2007)
    - Diesel / Dual Mode Locomotives & Bi-Level Coaches (1998 - 1999)

Planning EAM

Business Process Analysis

•Understand how assets are managed today

- Identify Current Inspection / Regulatory Requirements

•Compare to industry best practices (PAS55)

- Determine EAM maturity level

•Examine:

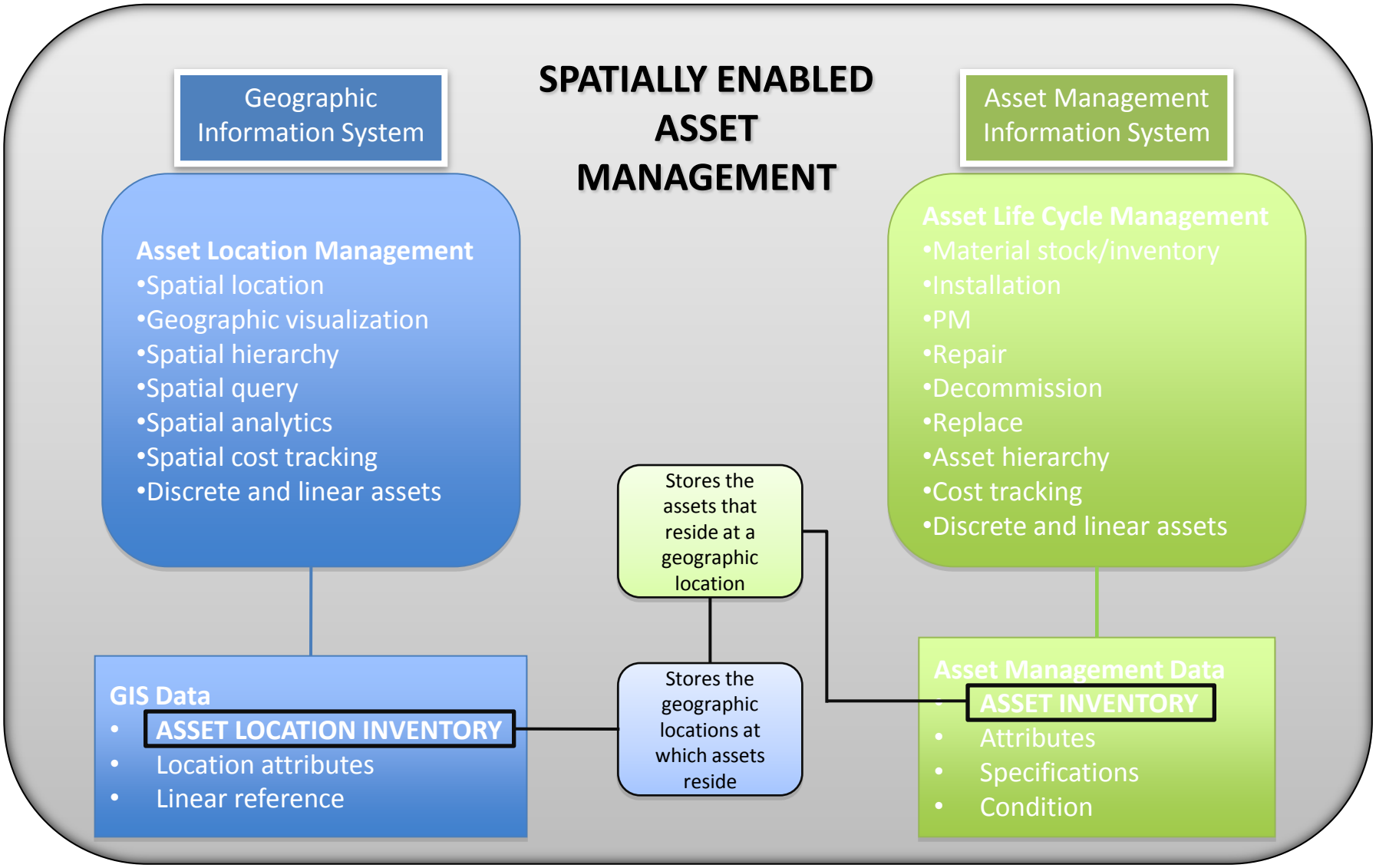
- LIRR's business needs and data required for informed decision making
- What level of detail and frequency of inspection is appropriate
- Changes / modifications to inspection process
- Risk and criticality of assets
- Policies / Resources needed to implement changes
- Support and training requirements for business process change and technology implementation

Bringing It Together

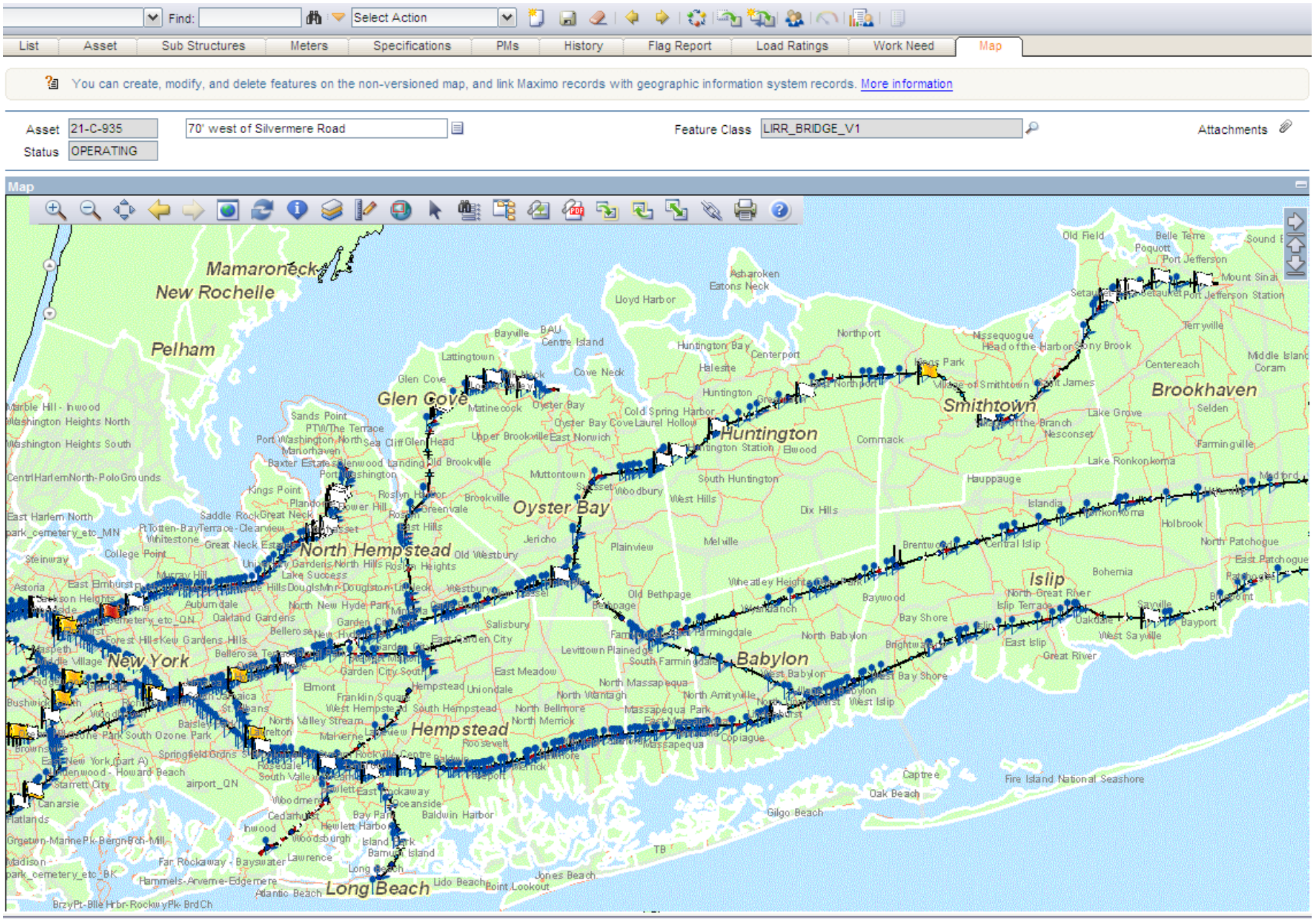
Building Upon Recent Experiences

- Lessons Learned
  - Already implemented new RCM program for Fleet, done in conjunction with large-scale fleet replacement
- GIS
  - Recent substantial investments in Corporate GIS
  - Training / Maintenance of GIS network
  - Active Users throughout Engineering, System Safety, etc.
- Recognized Unaddressed Data Needs
  - Make informed investment decisions / prioritization
  - Coordinate / refine data that was being collected / maintained by various departments / divisions with goal of migrating to corporate resource

EAM and Geospatial Technology



Map Interface - Bridge Flags



Infrastructure - Where to Start?

- **<u>Line Structures (Bridges, Viaducts, Tunnels & Culverts)</u>**
  - Set Inspection / Reporting Requirements
  - Biggest Rehabilitation Backlog
  - Majority of Bridge Projects are not full Replacements
  - Need for Data
  - Structures Department Strong Supporter of EAM
  - Deterioration / Hidden Problems / Bridge Strikes
  - Impact on Service
  - Concentrated in high traffic areas
  - Age of Bridges
  - Capital & Operating Funded Work
  - Geographic Nature / Involves other Assets (Signal, Power, Comm., etc.)


ASSET CATEGORY
Priorities
BUSINESS/ASSET MODELS
ASSET INVENTORY
FAILURES OR INCIDENTS
ASSET CONDITION
Work Management
ASSET WORK HISTORY
TRACKING COST
PLANNING AND DECISION MAKING
LEVEL 1
LEVEL 2
Define Use Case
Asset Model
Processes Re-engineering
Inventory and atributtes
GIS location and attributes
Trouble Tickets
Initial Inspection
Periodic Inspection
Condition Rating
Corrective Work Orders
Preventive Work Orders
Maintenance/Repairs
Replacements
Capital Improvements
Labor
Materials
Item Inventory
Forecasting
Resource Allocation
Capital Prioritization
GUIDEWAY
Structures
Bridges
Tunnels
Viaducts
Retaining walls
High Tension Towers
Culverts
Stations
Station Building
Platforms
Shelters
Canopies
Stairs
Escalators [1]
Elevators [1]
Overpasses
Parking Lots
[1] Part of Facilities
Rail
Ties

Strategy Planning

- **Power Substations**
  - Total of 108 Substations / Breaker Houses
  - Six date from 1945 - 1948
  - 57 Substations were built between 1970 and 1972
    - Electrification to Huntington
    - Power Demands of M-1 Fleet
  - Operational Challenges
  - Property Challenges
  - Balance resource availability with Operational Demands, while factoring in Risk
  - Critical nature of Queens substations
  - East Side Access Service Requirements

Requirements for Success

- Corporate Buy-in / Long-term commitments at all Levels
- Dedicated resources and support at the department level and the capital level
- Clearly defined EAM framework including policy, strategy, initiatives, and measurable goals
- Clearly defined roles, responsibilities, and processes that focus on achieving corporate goals
- EAM Working Groups – project level support and coordination
- EAM Executive Committee – EAM monitoring and issue resolution